Primary
National Strategy

Guidance

Curriculum
and standards

Overcoming barriers in mathematics –

helping children move from level 3 to level 4

Year 5 and 6 teachers, Mathematics subject leaders, Head teachers and LA consultants

Status: Recommended

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department for
children, schools and families

PC minimum specification for viewing the *Overcoming barriers in mathematics – helping children move from level 3 to level 4 CD-ROM* (00695-2007CDO-EN)

CPU: Pentium III or greater
RAM: 128 MB
HD with 100 MB of free space
CD-ROM drive
SVGA graphics card (16 bit colour)
Keyboard and mouse (Microsoft compatible)
Operating system: Windows 98 or later
PowerPoint 2000 or later (or PowerPoint viewer)

To open this CD-based resource place the CD in to the CD drive of your computer and double click on My computer. Open whichever drive letter corresponds to the CD drive and double click on the file named start_here.pps.

Mac minimum specification for viewing the *Overcoming barriers in mathematics – helping children move from level 3 to level 4 CD-ROM* (00695-2007CDO-EN)

CPU: Mac G4 500MHz processor or greater
RAM: 256 MB
HD with 100 MB of free space
CD-ROM drive
SVGA graphics card (16 bit colour)
Keyboard and mouse
Operating system: Mac OS X or later
PowerPoint 2000 or later (or PowerPoint viewer)

To open this CD-based resource place the CD in to the CD drive of your computer, open the CD from the desktop icon and run start_here.pps

Overcoming barriers in mathematics – helping children move from level 3 to level 4

Contents

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Introduction

Welcome to this CD-based resource. The materials are designed to help you ensure that, in mathematics, Year 5 and Year 6 children progress from level 3 to level 4 by the end of Key Stage 2. Increasing numbers of children are achieving level 4, but some children still meet barriers in their learning that slow or block their progress. The materials on the CD provide teaching resources and ideas upon which you can draw when planning additional support for those children. This CD is the first of similarly focused intervention materials that are to be developed for mathematics. We hope that you will find these materials useful when planning your teaching to help children working around the level 3 to level 4 border make good progress.

What mathematics appears on the CD?

The materials address key areas of mathematics that Year 5 and Year 6 children working at level 3 often find challenging: the areas of mathematics in which children need additional support to help them maintain progress over Key Stage 2. While the CD includes all the Year 5 and Year 6 learning objectives for mathematics, not all these objectives have materials to support them, only those that have been identified as common barriers to progress.

How were the areas of mathematics identified?

The decision as to which areas of mathematics to include on the CD was informed by a scrutiny of test scripts of children whose attainment fell below, but was close to, the level 4 boundary. This analysis was supported by evidence from other sources. It drew on QCA reports, research evidence and feedback from teachers and consultants. This evidence pointed to a number of common barriers in mathematics that often prevent children from making progress. These are the areas of mathematics that appear on the CD – the bits of mathematics children find difficult to learn, which are often the bits that are more difficult to teach.

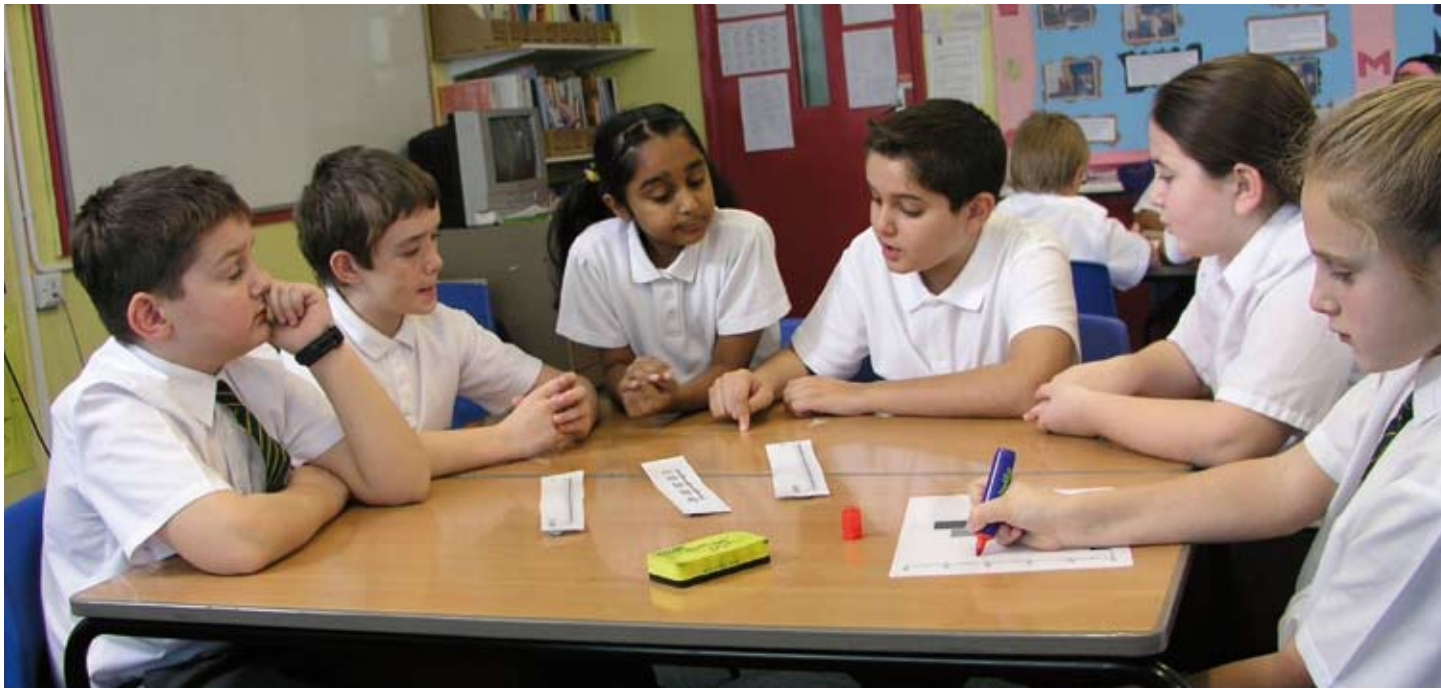
How do I access the materials?

The materials on the CD are accessed through the learning objectives for mathematics as set out in the Primary Framework. The objectives are organised into the seven strands of the Framework to help you match them to the Unit of work you might be teaching. At the back of this booklet there is a sequence of charts that make links between level descriptions, common barriers to progress, the associated Year 5 and Year 6 objectives, and materials on the CD, with reference to the Blocks and Units within the Primary Framework. This provides a see-at-a-glance guide to support you in identifying key barriers in moving children from level 3 to level 4 and pinpointing where children are having difficulties and how to move them on.

The CD draws on existing materials, some of which can be found on the Primary Framework, and provides extra support and guidance on teaching approaches designed to support children in overcoming identified barriers to progress.

Who are these materials aimed at?

The materials are designed to be used flexibly and as appropriate for your planning and teaching context. There are aspects that require intervention by you, as the teacher, drawing on your knowledge of the children's progress in mathematics, for example, when using the 'Can I…?' prompts and review questions to pinpoint



barriers to progress. After the barriers to learning have been identified, other elements might be used by a teaching assistant or additional adults to support learning, or might provide a focus for targeted booster support. These materials could be used with an individual child or with a group of children who share similar barriers to progress.

The materials are designed to be used with children who are at risk of not making the necessary progress to move from level 3 to secure level 4 and therefore not meeting age-related expectations by the end of Year 6.

How do the materials link to the Primary Framework?

The structure of the CD follows that of the Framework, with the strands and objectives providing the way into the 'Can I…?' questions and related teaching materials and resources. The grids at the end of this booklet show how these objectives fit into the Blocks and Units structure of the Framework, where further materials including 'I can…' targets and AfL prompts can be found.

How are the CD materials structured?

The entry point to access the materials has been aligned to six of the seven strands of mathematics used in the Primary Framework. The *Using and applying mathematics* strand is embedded in the materials rather than identified as a separate set of 'Can I...?' questions. This is to place the use and application of mathematics at the heart of the teaching and learning cycles to ensure that children have sufficient opportunity to apply their learning – and that the learning is sufficiently secure to enable them to use their mathematics in new contexts and make connections across their learning.

The materials on the CD support the *review and assess – teach – practise – apply – review and assess* cycle that underpins the Primary Framework. Each stage is supported by prompts and linked materials.

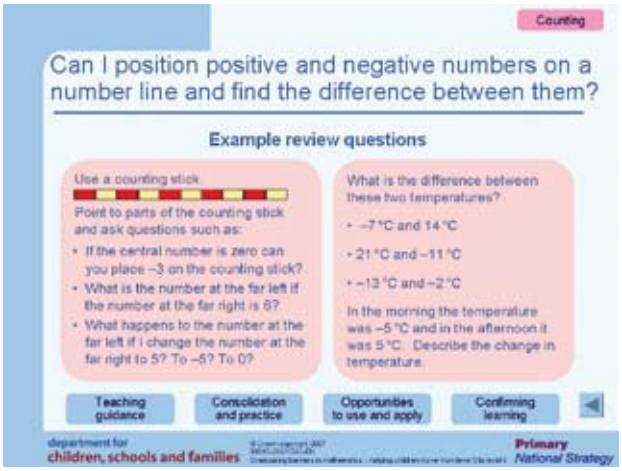
Below, the cycle is set out in more detail and shows how this informs the structure of the materials on the CD.

Review and assess	Teach	Practise	Apply	Review and assess
Example review and assess questions Use the example review questions to confirm that this is a barrier to learning and identify any specific misconceptions	**Teaching guidance** The teaching guidance document provides background information about vocabulary, models and images and teaching approaches	**Consolidation and practice** Select from suggested linked resources to provide opportunities for consolidation and practice	**Opportunities to use and apply** Use these prompts to ensure children can apply their knowledge within mathematics and/or other areas of the curriculum	**Confirming learning** Assess whether progress has been made by asking some of the probing questions

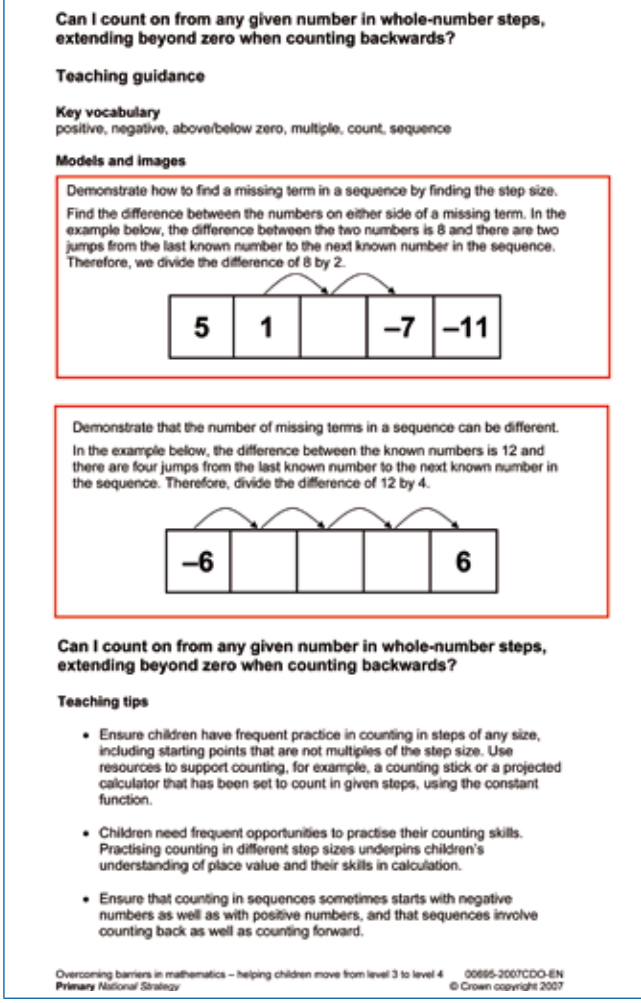
How should I use the materials on the CD?

The first step in using the CD is to carry out an assessment of the children's learning to identify where support is needed. Select the objective linked to an identified barrier to learning for an individual or group of pupils. Then select the relevant 'Can I…?' question linked to this barrier. The tables on the next few pages explain the structure of screens on the CD and the linked resources.

Contents of the CD



From your tracking of pupil progress and ongoing assessment you will have identified potential barriers to learning. The **Example review questions** provide support for confirming that this area is a barrier to learning for your children and identifying any specific misconceptions. The questions might be used as starting points for discussion with small groups or individuals. Depending upon the area of mathematics, they include suggestions for timed questions, closed and open-ended questions, and questions requiring the use of practical equipment such as a counting stick or set of digit cards.



Can I count on from any given number in whole-number steps, extending beyond zero when counting backwards?

Teaching guidance

Key vocabulary
positive, negative, above/below zero, multiple, count, sequence

Models and images

Demonstrate how to find a missing term in a sequence by finding the step size.

Find the difference between the numbers on either side of a missing term. In the example below, the difference between the two numbers is 8 and there are two jumps from the last known number to the next known number in the sequence. Therefore, we divide the difference of 8 by 2.

Demonstrate that the number of missing terms in a sequence can be different.

In the example below, the difference between the known numbers is 12 and there are four jumps from the last known number to the next known number in the sequence. Therefore, divide the difference of 12 by 4.

Can I count on from any given number in whole-number steps, extending beyond zero when counting backwards?

Teaching tips

- Ensure children have frequent practice in counting in steps of any size, including starting points that are not multiples of the step size. Use resources to support counting, for example, a counting stick or a projected calculator that has been set to count in given steps, using the constant function.
- Children need frequent opportunities to practise their counting skills. Practising counting in different step sizes underpins children's understanding of place value and their skills in calculation.
- Ensure that counting in sequences sometimes starts with negative numbers as well as with positive numbers, and that sequences involve counting back as well as counting forward.

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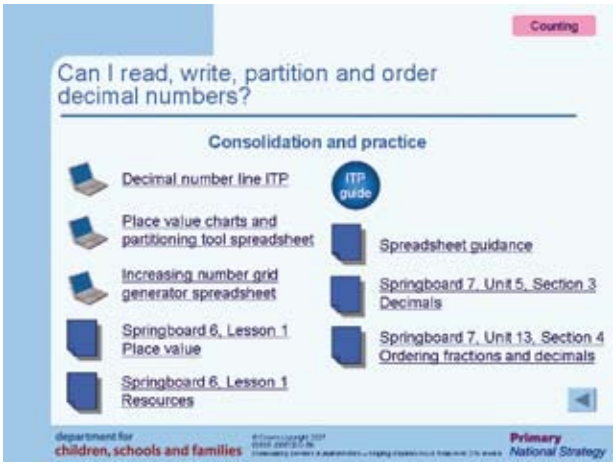
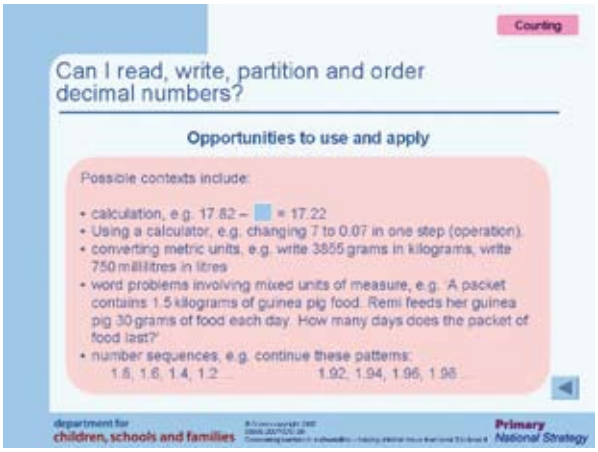
The **Teaching guidance** provides background information about appropriate vocabulary, models and images, and teaching approaches. The list of vocabulary is a useful reference point for key vocabulary that children need to be able to use and explain. The models and images are drawn from a variety of sources including the former unit plans, intervention materials and interactive teaching programs, and often include some suggestions for their use. The *Teaching tips* section provides a few starting points for tackling the area of mathematics with children, ways of linking concepts with other areas of the curriculum, or ways of overcoming misconceptions.



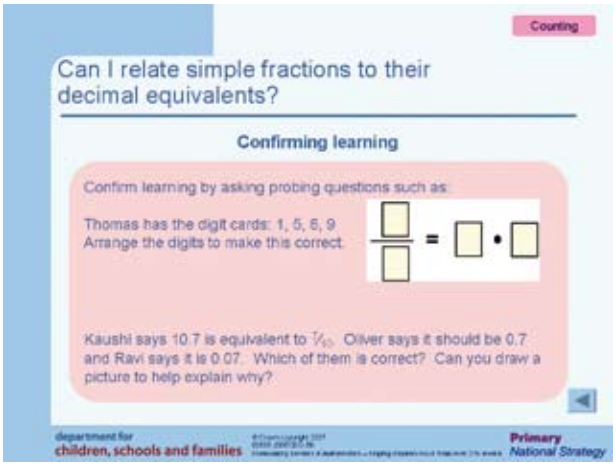
The **Consolidation and practice** pages provide links to a variety of existing resources that can be used by children within guided or independent work.

The ICT resources include interactive teaching programs (ITPs) and spreadsheets. Where the ITP guide symbol appears, this links to a guidance document to support the use of ITPs. Further ITPs can be found in the library of the Framework website at www.standards.dfes.gov.uk/primaryframeworks/library/Mathematics/ICTResources/itps/

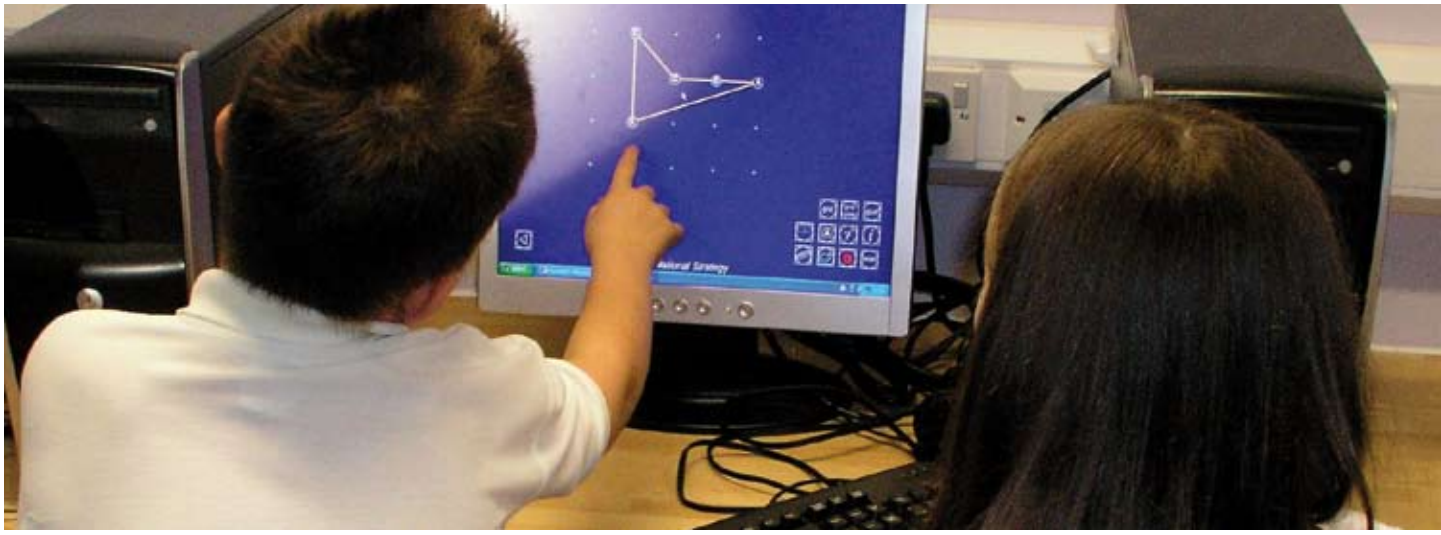
Also linked to these pages are intervention materials drawn from Springboard 5, 6 and 7 packages and the Wave 3 'Supporting children with gaps in their mathematical understanding' materials. In line with the Primary Framework, these materials have been linked where they could help children to overcome barriers to progress in a specific area of mathematics.



The **Opportunities to use and apply** pages give suggestions for how children might make use of a specific area of mathematics. This includes three key areas: applying understanding within a reasoning context (e.g. using knowledge of counting forwards/backwards to explain the rule for a sequence), applying within other areas of mathematics (e.g. using the ability to multiply and divide by 10 and 100 to work out conversions between units of measure) and finally, using and applying mathematics across the curriculum and within out-of-school contexts.



The **Confirming learning** section for each 'Can I…?' question provides questions, prompts and activities to probe children's understanding. These can be adapted to be used as assessment activities for individuals or small groups in order to assess whether progress has been made in this area of mathematics.



What is available to help me build the materials into my planning?

On the next few pages is a set of see-at-a-glance charts to help you to carry out your assessments and to plan appropriate learning and teaching. The level 3 and level 4 descriptions for the Number and algebra, Shape, space and measures and Handling data attainment targets are listed, together with the difficulties that the range of analyses has identified as most common in limiting children's progress from level 3 to level 4. Following the level descriptions for each attainment target are charts with the learning objectives for Years 5 and 6 taken from the relevant strands that can be used to inform your planning. These have the appropriate 'Can I …?' questions that appear on the CD aligned to the objectives. The 'Can I …?' questions might be shared with the children as part of the assessment process, inviting them to identify the mathematics they can do in the context of the question and what they still find difficult. They might also be turned into 'I can…' statements to generate curricular targets, using the materials on the CD and the Framework to draw together success criteria to share and discuss with the children.

Attainment targets, common difficulties, objectives and 'Can I...?' questions

Number and algebra

Attainment target 2: Number and algebra		
Level 3	Level 4	Commonly encountered difficulties include:
Pupils show understanding of place value in numbers up to 1000 and use this to make approximations. They begin to use decimal notation and to recognise negative numbers, in contexts such as money and temperature. Pupils use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers. They add and subtract numbers with two digits mentally and numbers with three digits using written methods. They use mental recall of the 2, 3, 4, 5 and 10 multiplication tables and derive the associated division facts. They solve whole-number problems involving multiplication or division, including those that give rise to remainders. They use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent.	Pupils use their understanding of place value to multiply and divide whole numbers by 10 or 100. In solving number problems, pupils use a range of mental methods of computation with the four operations, including mental recall of multiplication facts up to 10 × 10 and quick derivation of corresponding division facts. They use efficient written methods of addition and subtraction and of short multiplication and division. They add and subtract decimals to two places and order decimals to three places. In solving problems with or without a calculator, pupils check the reasonableness of their results by reference to their knowledge of the context or to the size of the numbers. They recognise approximate proportions of a whole and use simple fractions and percentages to describe these. Pupils recognise and describe number patterns, and relationships including multiple, factor and square. They begin to use simple formulae expressed in words. Pupils use and interpret coordinates in the first quadrant.	■ Using understanding of place value to multiply and divide numbers by 10, 100 and 1000 ■ Recalling multiplication facts and deriving associated division facts. Using known facts and place value to derive associated multiplication and division facts ■ Using efficient mental methods to add and subtract two numbers ■ Understanding and using written methods for subtraction and multiplication ■ Reading, writing, partitioning and ordering decimal numbers ■ Using a calculator to solve problems and interpreting the numbers on the display ■ Using fractions and percentages to describe proportions of a whole ■ Finding equivalent fractions and relating fractions to their decimal equivalents ■ Ordering and positioning positive and negative numbers and continuing sequences that involve negative numbers ■ Using coordinates in the first quadrant to draw, locate and complete shapes

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Counting and understanding number strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Count from any given number in whole-number and decimal steps, extending beyond zero when counting backwards; relate the numbers to their position on a number line	Find the difference between a positive and a negative integer, or two negative integers, in context	■ Can I position positive and negative numbers on a number line and find the difference between them? ■ Can I count on from any given number in whole-number steps, extending beyond zero when counting backwards?
Explain what each digit represents in whole numbers and decimals with up to two places, and partition, round and order these numbers	Use decimal notation for tenths, hundredths and thousandths; partition, round and order decimals with up to three places, and position them on the number line	■ Can I read, write, partition and order decimal numbers?
Express a smaller whole number as a fraction of a larger one; find equivalent fractions; relate fractions to their decimal representations	Express a larger whole number as a fraction of a smaller one; simplify fractions by cancelling common factors; order a set of fractions by converting them to fractions with a common denominator	
Understand percentage as the number of parts in every 100 and express tenths and hundredths as percentages	Express one quantity as a percentage of another; find equivalent percentages, decimals and fractions	■ Can I express tenths and hundredths as percentages? ■ Can I find simple equivalent fractions? ■ Can I relate simple fractions to their decimal equivalents?
Use sequences to scale numbers up or down; solve problems involving proportions of quantities	Solve simple problems involving direct proportion by scaling quantities up or down	

Knowing and using number facts strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences and doubles and halves of decimals	Use knowledge of place value and multiplication facts to 10 × 10 to derive related multiplication and division facts involving decimals	■ Can I use my tables to multiply and divide? ■ Can I use my tables to work out multiplication and division facts with decimals?
Recall quickly multiplication facts up to 10 × 10 and use them to multiply pairs of multiples of 10 and 100; derive quickly corresponding division facts	Use knowledge of multiplication facts to derive quickly squares of numbers to 12 × 12 and the corresponding squares of multiples of 10	■ Can I use my tables to multiply and divide? ■ Can I use my tables to work out multiplication and division facts with decimals?
Identify pairs of factors of two-digit whole numbers and find common multiples	Recognise that prime numbers have only two factors and identify prime numbers less than 100; find the prime factors of two-digit numbers	
Use knowledge of rounding, place value, number facts and inverse operations to estimate and check calculations	Use approximations, inverse operations and tests of divisibility to estimate and check results	

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Calculating strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 or 1000	Calculate mentally with integers and decimals: U.t ± U.t, TU × U, TU ÷ U, U.t × U, U.t ÷ U	■ Can I multiply and divide by 10 and 100 and 1000? ■ Can I add and subtract two numbers in my head quickly? ■ Can I use my tables to multiply and divide?
Extend mental methods for whole-number calculations		
Refine and use efficient written methods to multiply and divide HTU × U, TU × TU, U.t × U and HTU ÷ U	Use efficient written methods to add and subtract integers and decimals, to multiply and divide integers and decimals by a one-digit integer, and to multiply two-digit and three-digit integers by a two-digit integer	■ Can I use a written method to subtract? ■ Can I use a written method to multiply?
Use efficient written methods to add and subtract whole numbers and decimals with up to two places		
Find fractions using division, and percentages of numbers and quantities	Relate fractions to multiplication and division; express a quotient as a fraction or decimal; find fractions and percentages of whole-number quantities	■ Can I calculate a fraction of a number or quantity? ■ Can I calculate simple percentages of whole numbers or quantities?
Use a calculator to solve problems, including those involving decimals or fractions; interpret the display correctly in the context of measurement	Use a calculator to solve problems involving multi-step calculations	■ Can I interpret the numbers on a calculator display (including money, measurement and rounding up/down)? ■ Can I use a calculator to solve problems with more than one step?

Shape, space and measures

Attainment target 3: Shape, space and measures		
Level 3	Level 4	Commonly encountered difficulties include:
Pupils classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes. They use non-standard units, standard metric units of length, capacity and mass, and standard units of time, in a range of contexts.	Pupils make 3-D mathematical models by linking given faces or edges, draw common 2-D shapes in different orientations on grids. They reflect simple shapes in a mirror line. They choose and use appropriate units and instruments, interpreting, with appropriate accuracy, numbers on a range of measuring instruments. They find perimeters of simple shapes and find areas by counting squares. Pupils use and interpret coordinates in the first quadrant. (Attainment target 2: Number and algebra)	■ Estimating, measuring and calculating angles with accuracy ■ Estimating a quantity and choosing the most sensible unit of measure and equipment to use ■ Converting between units of measure ■ Reading and interpreting numbers on a scale ■ Finding the area and perimeter of rectangles ■ Using coordinates in the first quadrant to draw, locate and complete shapes

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Understanding shape strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Identify, visualise and describe properties of rectangles, triangles, regular polygons and 3-D solids; use knowledge of properties to draw 2-D shapes, and to identify and draw nets of 3-D shapes	Describe, identify and visualise parallel and perpendicular edges or faces; use these properties to classify 2-D shapes and 3-D solids Make and draw shapes with increasing accuracy and apply knowledge of their properties	
Complete patterns with up to two lines of symmetry; draw the position of a shape after a reflection or translation	Visualise and draw on grids of different types where a shape will be after reflection, after translations, or after rotation through 90° or 180° about its centre or one of its vertices	
Read and plot coordinates in the first quadrant; recognise parallel and perpendicular lines in grids and shapes: use a set-square and ruler to draw shapes with perpendicular or parallel sides	Use coordinates in the first quadrant to draw, locate and complete shapes that meet given properties	■ Can I use coordinates to draw, locate and complete shapes?
Estimate, draw and measure acute and obtuse angles using an angle measurer or protractor to a suitable degree of accuracy; calculate angles in a straight line	Estimate angles, and use a protractor to measure and draw them, on their own and in shapes; calculate angles in a triangle or around a point	■ Can I estimate and measure angles less than 180°? ■ Can I calculate angles on a straight line and in a triangle?

Measuring strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy; convert larger to smaller units using decimals to one place	Select and use standard metric units of measure and convert between units using decimals to two places	■ Can I estimate a quantity (mass, length or capacity) and choose the most sensible unit of measure and equipment to use? ■ Can I convert between units?
Interpret a reading that lies between two unnumbered divisions on a scale	Read and interpret scales on a range of measuring instruments, recognising that the measurement made is approximate and recording results to a required degree of accuracy; compare readings on different scales, for example when using different instruments	■ Can I read and use a scale on a thermometer, protractor, ruler, weighing scale and measuring cylinder?
Draw and measure lines to the nearest millimetre; measure and calculate the perimeter of regular and irregular polygons; use the formula for the area of a rectangle to calculate the rectangle's area	Calculate the perimeter and area of rectilinear shapes; estimate the area of an irregular shape by counting squares	■ Can I work out the area and perimeter of a rectangle?
Read timetables and time using 24-hour clock notation; use a calendar to calculate time intervals		

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Handling data

Attainment target 4: Handling data		
Level 3	Level 4	Commonly encountered difficulties include:
Pupils extract and interpret information presented in simple tables and lists. They construct bar charts and pictograms, where the symbol represents a group of units, to communicate information they have gathered, and they interpret information presented to them in these forms.	Pupils collect discrete data and record them using a frequency table. They understand and use the mode and range to describe sets of data. They group data, where appropriate, in equal class intervals, represent collected data in frequency diagrams and interpret such diagrams. They construct and interpret simple line graphs.	■ Interpreting the information on a range of graphs and charts ■ Drawing a conclusion from a graph or chart in order to answer a question ■ Understanding the meaning of points between labelled divisions on graphs ■ Using the language of probability to describe the likelihood of events

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Handling data strand		
Year 5 Objectives	Year 6 Objectives	Overcoming barriers sequences
Describe the occurrence of familiar events using the language of chance or likelihood	Describe and predict outcomes from data using the language of chance or likelihood	■ Can I use the vocabulary of probability to predict outcomes and discuss and explain events?
Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask	Solve problems by collecting, selecting, processing, presenting and interpreting data, using ICT where appropriate; draw conclusions and identify further questions to ask	■ Can I sort and interpret data in Venn and Carroll diagrams? ■ Can I explain to someone what information a graph or chart is showing? ■ Can I draw a conclusion from a graph or chart?
Construct frequency tables, pictograms, and bar and line graphs to represent the frequencies of events and changes over time	Construct and interpret frequency tables, bar charts with grouped discrete data, and line graphs; interpret pie charts	■ Can I understand the meaning of points between labelled divisions on graphs? ■ Can I interpret what the sectors in a pie chart represent?
Find and interpret the mode of a set of data	Describe and interpret results and solutions to problems using the mode, range, median and mean	■ Can I work out the mode and range of a set of data and use this to answer questions?

Links between Objectives and Units

Using and applying mathematics strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Solve one-step and two-step problems involving whole numbers and decimals and all four operations, choosing and using appropriate calculation strategies, including calculator use	5D1, 5E1, 5A2, 5D2, 5A3, 5D3, 5E3	Solve multi-step problems, and problems involving fractions, decimals and percentages; choose and use appropriate calculation strategies at each stage, including calculator use	6D1, 6E1, 6A2, 6D2, 6A3, 6D3, 6E3
Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem	5E1, 5B2, 5E2, 5B3, 5E3	Tabulate systematically the information in a problem or puzzle; identify and record the steps or calculations needed to solve it, using symbols where appropriate; interpret solutions in the original context and check their accuracy	6E1, 6B2, 6E2, 6B3, 6E3
Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry	5C1, 5C2, 5C3	Suggest, plan and develop lines of enquiry; collect, organise and represent information, interpret results and review methods; identify and answer related questions	6C1
Explore patterns, properties and relationships and propose a general statement involving numbers or shapes; identify examples for which the statement is true or false	5B1, 5B2, 5B3	Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols	6B1, 6B2, 6B3
Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols	5A1, 5C1, 5E1, 5A2, 5C2, 5E2, 5A3, 5C3	Explain reasoning and conclusions, using words, symbols or diagrams as appropriate	6A1, 6E1, 6A2, 6E2, 6A3

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Counting and understanding number strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Count from any given number in whole-number and decimal steps, extending beyond zero when counting backwards; relate the numbers to their position on a number line	5A1, 5A2, 5A3	Find the difference between a positive and a negative integer, or two negative integers, in context	6A1
Explain what each digit represents in whole numbers and decimals with up to two places, and partition, round and order these numbers	5A1, 5A2, 5A3	Use decimal notation for tenths, hundredths and thousandths; partition, round and order decimals with up to three places, and position them on the number line	6A1, 6A2, 6A3
Express a smaller whole number as a fraction of a larger one; find equivalent fractions; relate fractions to their decimal representations	5E1, 5E2, 5E3	Express a larger whole number as a fraction of a smaller one; simplify fractions by cancelling common factors; order a set of fractions by converting them to fractions with a common denominator	6E1, 6E2, 6E3
Understand percentage as the number of parts in every 100 and express tenths and hundredths as percentages	5E2, 5E3	Express one quantity as a percentage of another; find equivalent percentages, decimals and fractions	6E2, 6E3
Use sequences to scale numbers up or down; solve problems involving proportions of quantities	5E2, 5E3	Solve simple problems involving direct proportion by scaling quantities up or down	6E1, 6E2, 6E3

Knowing and using number facts strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences and doubles and halves of decimals	5A1, 5A2, 5B2, 5E2, 5A3, 5B3	Use knowledge of place value and multiplication facts to 10 × 10 to derive related multiplication and division facts involving decimals	6A1, 6B1, 6E1, 6A2, 6B2, 6B3, 6E3
Recall quickly multiplication facts to 10 × 10 and use them to multiply pairs of multiples of 10 and 100; derive quickly corresponding division facts	5A1, 5B1, 5E1, 5A2, 5B2, 5A3, 5B3	Use knowledge of multiplication facts to derive quickly squares of numbers to 12 × 12 and the corresponding squares of multiples of 10	6B1, 6B2, 6B3
Identify pairs of factors of two-digit whole numbers and find common multiples	5A1, 5B1, 5E1, 5A2	Recognise that prime numbers have only two factors and identify prime numbers less than 100; find the prime factors of two-digit numbers	6B1, 6B2, 6B3
Use knowledge of rounding, place value, number facts and inverse operations to estimate and check calculations	5A1, 5B1, 5A2, 5B2, 5D2, 5A3, 5B3, 5D3	Use approximations, inverse operations and tests of divisibility to estimate and check results	6A1, 6B1, 6D1, 6A2, 6B2, 6D2, 6A3, 6B3, 6D3

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Calculating strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 or 1000	5A1, 5D1, 5A2, 5D2	Calculate mentally with integers and decimals: U.t ± U.t, TU × U, TU ÷ U, U.t × U, U.t ÷ U	6A1, 6D1, 6A2, 6D2, 6A3, 6D3
Extend mental methods for whole-number calculations	5A1, 5E1, 5A2		
Use efficient written methods to add and subtract whole numbers and decimals with up to two places	5A1, 5B1, 5A2, 5D2, 5B3, 5D3	Use efficient written methods to add and subtract integers and decimals, to multiply and divide integers and decimals by a one-digit integer, and to multiply two-digit and three-digit integers by a two-digit integer	6D1, 6E1, 6A2, 6D2, 6A3, 6D3, 6E3
Refine and use efficient written methods to multiply and divide HTU × U, TU × TU, U.t × U and HTU ÷ U	5E1, 5D2, 5A3, 5D3, 5E3		
Find fractions using division, and percentages of numbers and quantities	5E1, 5E2, 5E3	Relate fractions to multiplication and division; express a quotient as a fraction or decimal; find fractions and percentages of whole-number quantities	6E1, 6E2, 6E3
Use a calculator to solve problems, including those involving decimals or fractions; interpret the display correctly in the context of measurement	5D1, 5E1, 5A2, 5D2, 5E2, 5A3, 5B3, 5D3	Use a calculator to solve problems involving multi-step calculations	6A1, 6D1, 6E1, 6A2, 6B2, 6C2, 6D2, 6E2, 6A3, 6B3, 6C3, 6D3, 6E3

Understanding shape strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Identify, visualise and describe properties of rectangles, triangles, regular polygons and 3-D solids; use knowledge of properties to draw 2-D shapes, and to identify and draw nets of 3-D shapes	5B1, 5B2, 5B3	Describe, identify and visualise parallel and perpendicular edges or faces; use these properties to classify 2-D shapes and 3-D solids	6B1, 6B2, 6B3
		Make and draw shapes with increasing accuracy and apply knowledge of their properties	6B1, 6B2, 6B3
Complete patterns with up to two lines of symmetry; draw the position of a shape after a reflection or translation	5B2, 5D3	Visualise and draw on grids of different types where a shape will be after reflection, after translations, or after rotation through 90° or 180° about its centre or one of its vertices	6D2
Read and plot coordinates in the first quadrant; recognise parallel and perpendicular lines in grids and shapes; use a set-square and ruler to draw shapes with perpendicular or parallel sides	5D1, 5D2, 5D3	Use coordinates in the first quadrant to draw, locate and complete shapes that meet given properties	6D2
Estimate, draw and measure acute and obtuse angles using an angle measurer or protractor to a suitable degree of accuracy; calculate angles in a straight line	5D2, 5D3	Estimate angles, and use a protractor to measure and draw them, on their own and in shapes; calculate angles in a triangle or around a point	6D2

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Measuring strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy; convert larger to smaller units using decimals to one place	5C1, 5D1, 5C2, 5D2, 5C3, 5D3	Select and use standard metric units of measure and convert between units using decimals to two places	6C1, 6D1, 6C2, 6D2, 6C3, 6D3
Interpret a reading that lies between two unnumbered divisions on a scale	5C1, 5D1, 5C2, 5D2, 5C3, 5D3	Read and interpret scales on a range of measuring instruments, recognising that the measurement made is approximate and recording results to a required degree of accuracy; compare readings on different scales, for example when using different instruments	6C1, 6D1, 6C2, 6C3, 6D3
Draw and measure lines to the nearest millimetre; measure and calculate the perimeter of regular and irregular polygons; use the formula for the area of a rectangle to calculate the rectangle's area	5D1, 5D2, 5D3	Calculate the perimeter and area of rectilinear shapes; estimate the area of an irregular shape by counting squares	6D1, 6D3
Read timetables and time using 24-hour clock notation; use a calendar to calculate time intervals	5D1, 5D3		

Handling data strand			
Year 5 Objectives	Units	Year 6 Objectives	Units
Describe the occurrence of familiar events using the language of chance or likelihood	5C2, 5C3	Describe and predict outcomes from data using the language of chance or likelihood	6C2, 6C3
Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask	5C1, 5C2, 5C3	Solve problems by collecting, selecting, processing, presenting and interpreting data, using ICT where appropriate; draw conclusions and identify further questions to ask	6C1, 6C2, 6C3
Construct frequency tables, pictograms, and bar and line graphs to represent the frequencies of events and changes over time	5C1, 5C2, 5C3	Construct and interpret frequency tables, bar charts with grouped discrete data, and line graphs; interpret pie charts	6C1, 6C2, 6C3
Find and interpret the mode of a set of data	5C1, 5C3	Describe and interpret results and solutions to problems using the mode, range, median and mean	6C1, 6C2, 6C3

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